91602
new 82-10

ontario hydro
research division

EXECUTIVE SUMMARY

CANADA BRICK QUARRY SURFACE WATER SURVEY
FIFTH ANNUAL REPORT, 1986

J. Complak
Chemist
Water Research Unit
Process Chemistry Section
Chemical Research Department

Since December, 1981, fly ash from Lakeview TGS, has been disposed of as landfill at Canada Brick Quarry, Mississauga, in accordance with a Provisional Certificate of Approval issued by the Ontario Ministry of the Environment which requires regular monitoring of local surface water and groundwater. Mary Fix Creek, which traverses the Canada Brick Quarry ash disposal site, was sampled on October 5, 1985 and on June 18, 1986, under base flow conditions. To date no fly ash leachate has been discharged from the underdrain sump to the Creek. No change in major ion chemistry was observed along the flow path studied. Levels of suspended solids were low, and concentrations of total trace metals, measured in unfiltered samples, generally conformed to Provincial Water Quality Objectives for surface waters.

job	file	date	report no.
31-175-892	837.71	December 15, 1986	86-331-K

91602
new 82-10

ontario hydro
research division

TO: Mr. D. Erwin
Manager of Procurement - General Products
Supply Division

Attn: Mr. J.H.P. Buckingham
Senior Supervisor
Ash Management

CANADA BRICK QUARRY SURFACE WATER SURVEY FIFTH ANNUAL REPORT, 1986

J. Complak

Mary Fix Creek was sampled under base flow conditions on October 5, 1985, and June 18, 1986. To date, no fly ash leachate has been discharged from the fly ash sump to the Creek. No change in major ion chemistry was observed along the flow path studied. Levels of suspended solids were low, and concentrations of total trace metals generally conformed to the Provincial Water Quality Objectives for surface waters.

1. INTRODUCTION

In accordance with the MOE's Provisional Certificate No A220113, a monitoring program of surface water quality and water flow of the Mary Fix Creek has been under way at the Canada Brick Quarry Reclamation Project, Mississauga (Figure 1). The first four annual reports/1,2,3,4/ showed no significant change in surface water chemistry resulting from fly ash landfill operations, which commenced December 18, 1981. Calibration of the Mary Fix Creek flow rate (Figure 2) was completed in 1983; a 'portable' chain gauge was constructed and has since been used for flow rate measurements at the CP railway overpass, where the Creek enters Canada Brick property.

2. SURFACE WATER QUALITY MONITORING

As in previous years, no fly ash leachate was discharged from the sump into the Mary Fix Creek during 1986. Any leachate that collected in the sump was pumped into a water spray truck and used for dust suppression at the site. On October 5, 1985 and June 18, 1986, sampling was carried out under base flow conditions (0.02 m^3/s).

Figure 1

86-331

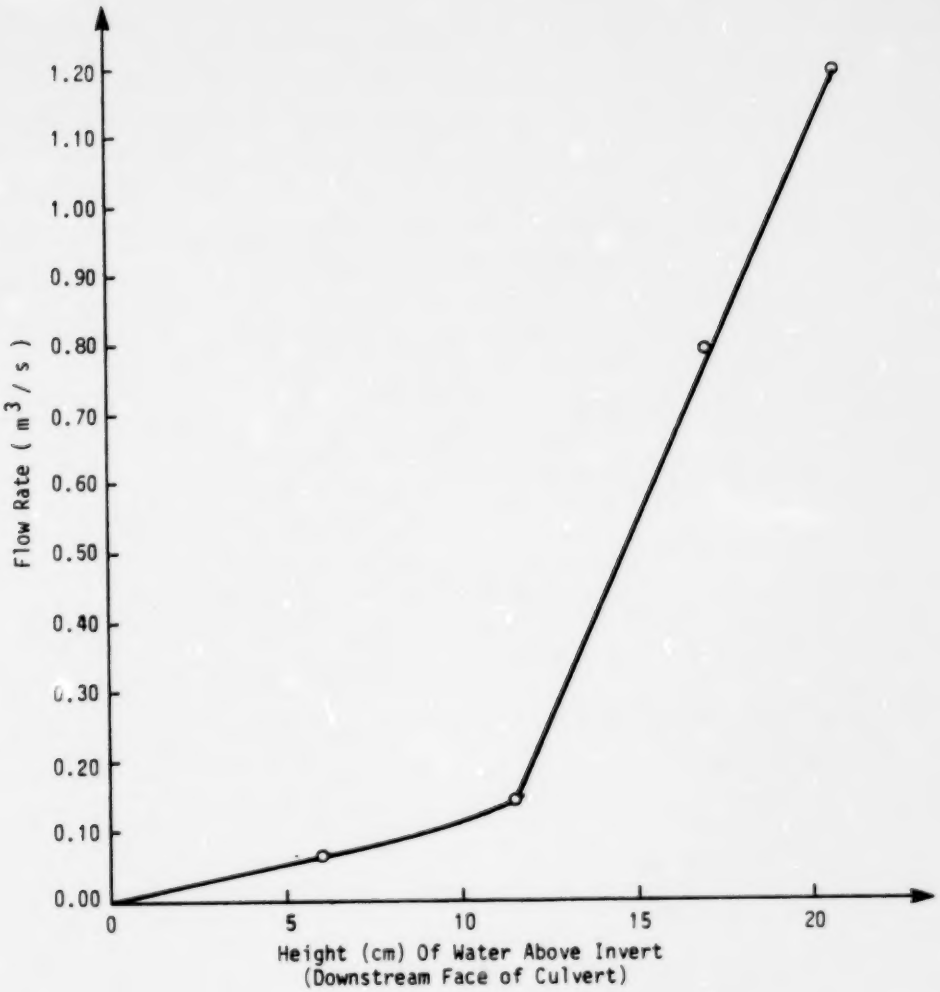


FIGURE 2

CALIBRATION CURVE OF MARY FIX CREEK DISCHARGE
AT CP RAILWAY OVERPASS

Water samples were taken at each of four locations:

(i) CP Overpass (CPO)
(ii) South Property Fence (SPF)
(iii) Dundas Street Culvert (DSC)
(iv) Paisley Street Bridge (PSB)

To meet the MOE requirement for determination of total trace heavy metals in surface waters/5/, duplicate samples were taken. The following procedure (described in detail in Appendix A) was followed:

A pair of 1-L samples was taken at each location. One of each pair was filtered through a 0.45 μm Millipore filter prior to submission for chemical analysis, while the other was submitted unfiltered for determination of total trace heavy metals (except mercury)/5,6/.

The 1985-1986 analytical data are given in Tables I to IV (Appendix B), together with all of the previous data to facilitate comparison. Major ion chemistry is summarized in Tables V to VIII (Appendix C). This data was used to construct Piper trilinear diagrams for each of the four sampling points (see Figures 3 to 6, Appendix D).

2.1 Major Ion Chemistry

The data (as represented by Piper diagrams, Figures 3 to 6 in Appendix D) on the characteristics of the Mary Fix Creek water passing through the Canada Brick Quarry during the 1985-1986 sampling period, show the quality of the water to be close to or within the region of 'no dominance' of cations or anions and that there was no significant change in major ion chemistry of the Creek water within the Quarry. However, there was an overall reduction of 50% to 80% in the concentrations of dissolved solids in the waters sampled in June, 1986, from the concentrations found in the waters sampled in July, 1985. The high 1985 dissolved solids concentrations were attributed to evaporation during the hot, dry summer/4/.

2.2 Minor/Trace Metal Chemistry

Levels of suspended solids were low, except in the October 1985 sample, from location SPF, in which the suspended solids concentration was 165 mg/L. This was likely due to high turbulence of the Creek at the time. Most minor/trace components of water in the Mary Fix Creek remained at total concentrations below the Provincial Water Quality Objectives. Notable exceptions to this were the following elements present in the June 18, 1986 samples.

> Aluminum (Objective - undefined tolerance limit) present at the CP Overpass at 22.7 mg/L on June 18, 1986, dropping to 5 mg/L or less at the downstream sampling points. The high aluminum value was associated with a high iron content in the same sample.

Iron (Objective 0.3 mg/L) present at 38 mg/L at the CP Overpass, dropping to 4.2 mg/L at the South Property Fence, and 3 mg/L or less at the Dundas Street Culvert and the Paisley Street Bridge.

Copper (Objective 0.005 mg/L) present at the CP Overpass at 0.045 mg/L, passed the South Property Fence at 0.015 mg/L, remaining at 0.014 mg/L thereafter.

Nickel (Objective <0.025 mg/L) present at the CP Overpass at 0.044 mg/L, dropping to <0.005 mg/L downstream.

Zinc (Objective <0.03 mg/L) present at the CP Overpass at 0.1 mg/L, <0.02 mg/L at the South Property Fence and 0.19 mg/L at the Paisley Street Bridge.

The concentrations of the above elements in the waters examined are not considered to be significant. The inconsistent variations in the concentrations are believed to be caused by changes in the type and amount of natural suspended matter present in the Creek water at the time of sampling.

The high (~85 mg/L) nitrate levels observed last year/4/ dropped to normal levels of 6 mg/L at the Paisley Street Bridge. There are no obvious reasons for the previous increase and the current decrease in nitrate levels.

3. SUMMARY AND CONCLUSIONS

The Mary Fix Creek was sampled under base flow conditions in October, 1985 and June, 1986. There were generally low levels of suspended solids present. At all four sampling points, the water was characterized by 'no dominance' of cations and anions. Minor and trace metal components were below MOE Objectives for surface waters, except for Al, Fe, Cu, Ni and Zn, which at some survey locations were marginally excessive in the unfiltered samples.

The data obtained on the Mary Fix Creek water during the 1985-86 monitoring period indicate no contamination of the Mary Fix Creek by fly ash leachate from the disposal site.

Approved by:

O.A. Kupcis
Manager
Chemical Research Department

Submitted by:

J. Complak
Chemist
Water Chemistry Unit
Process Chemistry Section

Reviewed by:

D.J.R. Dodd
Supervising Engineer
Process Chemistry Section

JC:rv

REFERENCES

1. Ontario Hydro Research Division Report No 82-480-K.

2. Ontario Hydro Research Division Report No 83-523-K.

3. Ontario Hydro Research Division Report No 84-453-K.

4. Ontario Hydro Research Division Report No 85-326-K.

5. "Water Management. Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment." Published November, 1978.

6. "Standard Methods for the Examination of Water and Wastewater," 15th Edition, Part 302, American Public Health Association, New York, N.Y., 1980.

APPENDIX A

CANADA BRICK QUARRY SURFACE WATER SURVEY

(MARY FIX CREEK)

METHOD OF

SAMPLE COLLECTION AND

PREPARATION FOR ANALYSIS

Pairs of samples from each location were collected in specially acid-pretreated linear polyethylene (LPE) 1-L bottles, stored in a cooler ($\sim 4^{\circ}C$) and returned the same day to the laboratory. Details of sample handling and preservation, prior to submission for detailed chemical analysis, are described below.

(a) **Filtered Samples**

One sample of each pair was filtered in the laboratory through a 0.45 µm Millipore filter to remove suspended solids. The glass Millipore vacuum filtration apparatus was cleaned by soaking in 1:1 hydrochloric acid (HCl) followed by a deionized water rinse and a further soaking in 1:1 nitric acid (HNO_3). This was followed by several thorough rinsings with deionized water. Millipore filters were rinsed by passing 500 mL of deionized water through the filter and discarding the filtrate. A small volume ($\sim$20 mL) of the sample was passed through the filter and also discarded, then the bulk of the sample was filtered. The empty original sample container was rinsed several times with deionized water, given a final rinse using a small volume ($\sim$10 mL) of sample filtrate, and reused for storing the unacidified portion.

The portion of the filtrate for trace metal analysis was acidified with ultrapure HNO_3 to a background concentration of 0.1 M. The unacidified portion for pH, alkalinity, conductivity and anion analysis was stored at $\sim 4^{\circ}C$.

(b) **Unfiltered Samples**

To determine total concentrations of dissolved components (in particular, trace metals), samples were submitted for chemical analysis without filtration in accordance with MOE Objectives/5/. A portion of each was acidified with ultrapure HNO_3 to a background of 0.1 M, and an unacidified portion stored at $\sim 4^{\circ}C$ pending pH, alkalinity, conductivity and anion analysis.

APPENDIX B

CANADA BRICK QUARRY SURFACE WATER

(MARY FIX CREEK)

CHEMICAL ANALYSIS

1980-1986

Sampling Locations

CPO = CP Overpass
SPF = South Property Fence
DSC = Dundas Street Culvert
PSB = Paisley Street Bridge

All values are in mg/L except pH and conductivity

- pH in pH units
- conductivity in mS/m

Table I

Chemical Characteristics of Canada Brick Quarry Surface Water

Location CPO

Date	800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017	831018*
AG	--	<0.0002	--	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	--	<0.200	--	<0.200	<0.600	<0.200	<0.500	<0.500	<0.500	<0.500	6.00
ALKCO3	2.00	--	<5.00	<5.00	24.0	<5.00	10.0	26.0	24.0	<5.00	<5.00
ALKHCO3	201	110	36.0	86.0	240	64.0	137	163	165	64.0	68.0
ALKOH	<5.00	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	0.0010	--	<0.0010	0.0010	<0.0020	<0.0020	<0.0010	<0.0010	0.0010	<0.0010
B	--	<0.500	--	<1.00	<0.500	<0.500	<1.00	0.160	0.190	0.110	0.110
BA	--	<1.00	--	<2.00	<8.00	1.00	1.30	<2.00	<0.500	<1.00	<1.00
BE	--	--	--	--	<0.0002	<0.0002	<0.0002	--	--	--	--
BR	--	0.100	--	<0.200	0.600	<0.200	1.40	0.210	0.590	<0.0500	<0.0500
CA	81.0	57.0	15.0	34.0	116	43.0	72.0	89.0	88.0	29.0	31.0
CD	--	0.0009	--	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
CL	136	40.0	26.0	60.0	177	22.0	85.0	120	130	24.0	24.0
CO	--	--	--	--	--	--	<0.0500	--	--	--	--
COND	94.0	47.0	19.0	39.0	124	35.0	66.0	94.0	94.0	28.3	28.6
CR	--	<0.100	--	<0.0500	<0.0500	0.0030	<0.0500	<0.100	<0.100	<0.100	<0.100
CR(VI)	--	0.0090	--	0.0080	0.0040	--	--	<0.0100	<0.0100	<0.0100	<0.0100
CU	--	0.0030	--	0.0050	0.0040	0.0080	0.0030	0.0040	0.0050	0.0030	0.0100
FE	--	<0.0500	--	0.0500	<0.0500	<0.0500	<0.0100	<0.0500	0.460	0.130	5.60
HARD	303	208	49.0	120	429	142	250	313	315	96.0	119
HG	--	--	--	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
I	--	<0.0100	--	<0.0200	<0.200	<0.0500	<0.0500	<0.0050	<0.0050	<0.0050	<0.0050
K	6.00	4.90	3.90	4.30	4.00	3.40	4.90	0.660	0.670	4.90	6.30
MG	24.4	16.0	2.70	8.30	34.0	8.40	18.0	22.0	23.0	5.70	7.80
MN	--	<0.0200	--	0.200	0.240	<0.0200	<0.0200	0.0500	0.0600	<0.0500	0.260
MO	--	<0.500	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
NA	60.0	20.0	16.0	27.0	97.0	12.0	34.0	71.0	71.0	16.0	16.0
NI	--	<0.0050	--	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0060
NO3	<0.100	<0.100	--	0.100	<0.200	17.0	4.50	<1.00	0.440	0.0200	1.43
PB	--	0.0020	--	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.0160
PH	8.30	8.10	7.00	7.80	8.20	7.90	8.00	8.30	8.20	7.90	7.70
SE	--	0.0010	--	<0.0010	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010
SIO2	--	5.00	--	3.30	4.80	3.60	7.40	7.47	7.10	3.89	3.70
SO4	81.0	70.0	14.0	26.0	140	49.0	95.0	95.0	94.0	30.0	29.0
SR	--	0.130	--	0.140	0.800	0.130	0.280	0.500	0.500	0.120	0.150
TDS105	--	370	--	260	756	208	380	628	614	190	190
TI	--	<0.500	--	<1.00	<2.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	15.0	22.0	12.0	17.0	6.00	4.00	8.00	10.0
TSS105	--	22.0	--	--	--	--	31.0	7.00	7.00	--	15.0
U	--	<0.0100	--	<0.0100	<0.0600	<0.0200	<0.0010	<0.0100	<0.0100	<0.0500	<0.0500
V	--	<0.0050	--	<0.0100	<0.0200	<0.0030	<0.500	<0.0050	<0.0050	<0.0050	<0.0050
ZN	--	<0.0200	--	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0400

* Unfiltered sample dated one day after actual sampling.

Table I (Cont)

Chemical Characteristics of Canada Brick Quarry Surface Water

Location CP0

Date	840217	840218*	840930	841001*	850702	850703*	851005	851006*	860618	860619*
AG	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	<0.500	6.80	<0.500	1.60	<1.00	<1.00	<1.00	3.30	<1.00	22.7
ALKCO3	<5.00	<5.00	7.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
ALKHCO3	37.0	45.0	95.0	103	218	219	107	90.0	188	188
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0050
B	0.0800	0.0500	<0.0500	<0.0500	0.150	0.180	0.100	0.160	0.130	0.170
BA	<1.00	<1.00	<2.00	<2.00	<5.00	<5.00	<0.500	<0.500	<0.500	<0.500
BE	--	--	--	--	--	--	--	--	--	--
BR	<0.100	<0.100	<0.200	0.200	0.900	<0.500	<0.100	<0.100	0.300	<0.500
CA	21.4	26.9	34.7	46.1	130	129	39.1	40.9	74.0	88.0
CD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	<0.0002	<0.0002
CL	61.5	66.1	99.0	98.0	639	572	43.6	42.2	193	192
CO	--	--	--	--	--	--	--	--	--	--
COND	34.0	34.0	62.0	61.0	241	240	40.5	40.0	114	114
CR	<0.0500	<0.0500	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
CR(VI)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0100	<0.0100
CU	0.0090	0.0120	0.0020	0.0080	0.0070	0.0090	0.0040	0.0030	0.0060	0.0450
FE	0.100	9.60	<0.100	0.880	<0.0500	0.180	0.100	1.95	<0.0500	38.0
HARD	71.0	116	137	166	494	491	134	143	273	421
HG	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002
I	<0.0500	<0.0500	0.0600	<0.0600	<0.100	<0.100	<0.0500	<0.0600	<0.100	<0.300
K	3.10	7.30	4.87	5.49	6.75	6.48	4.61	4.95	5.00	7.50
MG	4.30	7.70	12.2	12.5	40.7	41.2	8.93	9.96	21.7	32.5
MN	0.0800	0.340	<0.0500	<0.0500	0.0980	0.0980	<0.0500	0.0500	0.0500	0.700
MO	<0.500	<0.500	<0.500	<0.500	<0.500	0.500	<0.500	<0.500	<0.500	<0.500
NA	35.0	33.0	34.6	47.8	310	313	28.9	29.3	105	104
NI	<0.0050	0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0050	<0.0050	<0.0050	0.0440
NO3	4.09	4.20	0.130	0.0900	--	<0.0090	0.337	1.86	1.23	1.70
PB	<0.0020	0.0080	<0.0020	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020	<0.0050	<0.0050
PH	7.40	7.50	7.90	7.60	8.30	8.30	7.80	7.30	8.10	7.90
SE	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0030	0.0010	0.0030
SIO2	2.94	12.0	2.70	8.50	1.41	2.06	0.620	3.13	6.25	--
SO4	17.3	18.3	44.0	43.0	151	140	38.5	37.7	67.0	70.0
SR	0.100	0.130	0.340	0.340	1.22	1.22	0.400	0.320	0.700	0.780
TDS105	222	230	392	378	1460	1350	252	239	550	650
TI	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	12.4	12.3	25.0	25.0	30.0	27.5	12.0	9.00	30.0	45.0
TSS105	--	387	--	--	--	3.10	--	14.0	--	--
U	<0.0100	<0.0100	<0.0500	<0.0500	<0.100	<0.100	<0.0500	<0.0200	0.0200	<0.100
V	<0.0050	0.0300	<0.0100	<0.0100	<0.100	<0.0500	<1.00	<1.00	<0.0100	0.180
ZN	<0.0200	0.0300	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0200	<0.0200	0.100

* Unfiltered sample dated one day after actual sampling.

Table II

Chemical Characteristics of Canada Brick Quarry Surface Water

Location SPF

Date	800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017	831018*
AG	--	0.0002	--	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	--	<0.200	--	<0.200	<3.00	<0.200	<0.500	<0.500	<0.500	<0.500	23.0
ALKCO3	5.60	--	<5.00	<5.00	14.0	<5.00	13.0	14.0	25.0	<5.00	<5.00
ALKHCO3	190	110	40.0	83.0	99.0	63.0	120	117	107	67.0	94.0
ALKOH	<5.00	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	0.0010	--	<0.0010	<0.0010	<0.0020	<0.0020	0.0010	0.0010	0.0050	<0.0010
B	--	<0.500	--	<1.00	2.50	<0.500	<1.00	2.10	2.11	0.200	0.200
BA	--	<1.00	--	<2.00	<40.0	1.00	1.40	<2.00	<2.00	<1.00	<1.00
BE	--	--	--	--	<0.0002	<0.0002	<0.0002	--	--	--	--
BR	--	0.100	--	<0.200	16.0	0.300	1.50	12.0	12.0	0.150	0.250
CA	79.0	57.0	17.0	33.0	259	45.0	72.0	207	208	29.0	40.0
CD	--	0.0002	--	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0003
CL	122	42.0	34.0	55.0	1700	41.0	215	1200	1130	35.0	35.0
CO	--	--	--	--	--	--	<0.0500	--	--	--	--
COND	90.0	50.0	23.3	36.5	600	43.0	107	445	445	34.0	34.1
CR	--	<0.100	--	<0.0500	<0.0500	0.0040	<0.0500	<0.100	<0.100	<0.100	<0.100
CR(VI)	--	0.0050	--	<0.0050	0.0040	--	--	<0.0100	<0.0100	<0.0100	<0.0100
CU	--	0.0030	--	0.0050	0.0070	0.0070	0.0030	0.0030	0.0040	0.0030	0.0300
FE	--	0.0500	--	0.0500	<0.0500	<0.0500	<0.100	<0.0500	0.410	0.130	38.0
HARD	291	215	56.0	116	869	148	250	707	712	97.0	250
HG	--	--	--	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
I	--	<0.0100	--	<0.0200	<1.00	<0.0500	<0.0500	<0.0200	<0.0200	<0.0050	<0.0050
K	5.00	5.40	4.00	4.60	42.0	4.10	9.80	35.0	35.0	6.20	9.20
MG	22.8	16.0	3.30	8.10	54.0	8.60	18.0	46.0	47.0	6.10	20.0
MN	--	<0.0200	--	0.200	0.0400	<0.0200	<0.0200	0.0500	0.0600	<0.0500	0.750
MO	--	0.500	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
NA	61.0	26.0	19.0	28.0	900	2.90	105	630	640	27.0	27.0
NI	--	<0.0050	--	<0.0050	0.0120	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0240
NO3	<0.100	<0.100	--	0.100	15.0	21.0	8.00	13.0	10.1	1.36	2.21
PB	--	<0.0020	--	0.0200	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.0210
PH	8.50	8.20	7.40	7.90	8.20	7.90	8.10	8.20	8.10	7.50	7.80
SE	--	<0.0010	--	<0.0010	<0.0020	<0.0020	<0.0020	0.0030	0.0030	<0.0010	<0.0010
SI02	--	6.50	--	3.80	2.60	4.00	6.80	4.67	3.98	3.66	3.64
SO4	78.0	72.0	14.0	23.0	450	63.0	145	330	330	38.0	36.0
SR	--	0.130	--	0.140	4.80	0.200	0.640	2.85	2.85	0.190	0.280
TDS105	--	370	--	252	3770	260	620	2810	2680	220	240
TI	--	<0.500	--	<1.00	<10.0	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	15.0	9.00	10.0	17.0	12.0	14.0	13.0	12.0
TSS105	--	41.0	--	--	--	--	85.0	15.0	15.0	--	31.0
U	--	<0.0100	--	<0.0100	<0.300	<0.0200	<0.0010	<0.0500	<0.0500	<0.0500	<0.0500
V	--	<0.0050	--	<0.0100	<0.100	<0.0030	<0.500	<0.0200	<0.0200	<0.0050	0.0170
ZN	--	<0.0200	--	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.120

* Unfiltered sample dated one day after actual sampling.

Table II (Cont)

Chemical Characteristics of Canada Brick Quarry Surface Water

Location SPF

Date	840217	840218*	840930	841001*	850702	850703*	851005	851006*	860618	860619*
AG	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	<0.500	9.00	<0.500	1.90	<1.00	<1.00	<1.00	3.30	<1.00	5.00
ALKCO3	<5.00	<5.00	9.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
ALKHCO3	39.0	50.0	94.0	103	137	138	88.0	90.0	187	189
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	0.0030	<0.0010	<0.0010
B	0.0700	0.0700	0.150	0.200	3.04	3.05	0.230	0.270	0.270	0.310
BA	<1.00	<1.00	<2.00	3.00	<5.00	<5.00	<0.500	<0.500	<0.500	<0.500
BE	--	--	--	--	--	--	--	--	--	--
BR	<0.100	0.200	0.500	0.500	12.0	12.0	<0.100	0.200	0.400	0.500
CA	22.0	35.0	35.7	49.9	261	264	41.4	42.5	72.7	75.0
CD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	<0.0002	<0.0002
CL	65.4	66.6	125	118	1420	1310	51.1	51.5	215	210
CO	--	--	--	--	--	--	--	--	--	--
COND	36.0	37.0	70.0	70.0	505	505	46.5	47.5	120	122
CR	<0.0500	<0.0500	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
CR(VI)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0100	<0.0100
CU	0.0030	0.0170	0.0080	0.0070	0.0060	0.0040	0.0030	0.0030	0.0070	0.0150
FE	0.0900	16.0	<0.100	1.48	<0.0500	0.351	0.0500	2.29	<0.0500	4.20
HARD	73.0	159	120	164	881	900	141	148	268	289
HG	<0.0002	<0.0002	0.0006	0.0007	0.0003	0.0002	<0.0002	0.0005	<0.0002	<0.0002
I	<0.0500	<0.0500	<0.0600	<0.0600	<0.100	<0.200	<0.0500	<0.0500	<0.100	<0.300
K	3.40	8.30	3.98	5.45	40.4	42.5	5.95	6.21	5.87	7.80
MG	4.50	10.5	7.50	9.60	55.9	58.6	9.19	10.2	21.2	23.2
MN	0.0800	0.460	<0.0500	<0.0500	0.0500	0.0500	<0.0500	0.0500	<0.0500	0.0900
MO	<0.500	<0.500	<0.500	<0.500	1.27	1.27	<0.500	<0.500	<0.500	<0.500
NA	43.0	36.0	49.4	70.8	720	725	40.8	38.3	130	130
NI	<0.0050	0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0050	<0.0050	<0.0050	0.0050
NO3	3.94	4.91	0.180	0.130	--	83.7	0.0350	3.89	3.08	2.77
PB	<0.0020	0.0100	<0.0020	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020	<0.0050	<0.0050
PH	7.30	7.60	7.90	7.70	8.20	8.20	7.50	7.30	8.30	8.30
SE	<0.0010	<0.0010	<0.0010	<0.0010	0.0040	0.0020	0.0040	0.0030	0.0010	<0.0010
SIO2	3.11	103	2.70	9.80	3.45	10.2	0.210	25.3	5.15	5.05
SO4	18.5	19.6	50.0	45.6	768	718	58.4	55.5	85.0	88.0
SR	0.120	0.160	0.490	0.520	5.95	5.95	0.310	0.350	0.770	0.79
TDS105	230	244	423	430	3440	3250	243	276	600	700
TI	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	11.8	13.5	19.0	21.0	25.0	26.5	9.00	10.0	23.0	25.0
TSS105	--	590	--	--	--	35.2	--	165	--	--
U	<0.0100	<0.0100	<0.0500	<0.0500	<0.100	<0.100	<0.0500	<0.0200	0.0200	<0.0500
V	<0.0050	0.0800	<0.0100	<0.0100	<0.100	<0.0500	<1.00	<1.00	<0.0100	0.0200
ZN	<0.0200	0.0400	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0400	<0.0200	<0.0200

* Unfiltered sample dated one day after actual sampling.

Table III

Chemical Characteristics of Canada Brick Quarry Surface Water

Location DSC

Date	800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017	831018*
AG	--	--	--	--	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	--	--	--	--	<3.00	<0.200	<0.500	<0.500	<0.500	<0.500	13.0
ALKCO3	--	--	<5.00	--	17.0	<5.00	13.0	15.0	27.0	<5.00	<5.00
ALKHCO3	--	--	36.0	--	92.0	66.0	121	121	110	75.0	91.0
ALKOH	--	--	<5.00	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	--	--	--	<0.0010	<0.0020	<0.0020	0.0010	0.0010	0.0040	<0.0010
B	--	--	--	--	2.50	<0.500	<1.00	2.05	2.06	0.180	0.190
BA	--	--	--	--	<40.0	1.00	1.30	<2.00	<2.00	<1.00	<1.00
BE	--	--	--	--	<0.0002	<0.0002	<0.0002	--	--	--	--
BR	--	--	--	--	14.0	0.300	0.200	12.0	10.0	0.150	0.190
CA	--	--	15.0	--	262	44.0	70.0	214	208	33.0	38.0
CD	--	--	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0002
CL	--	--	26.0	--	1580	38.0	165	1200	1030	40.0	39.0
CO	--	--	--	--	--	--	<0.0500	--	--	--	--
COND	--	--	20.0	--	560	42.0	105	450	450	37.6	37.8
CR	--	--	--	--	<0.0500	0.0060	<0.0500	<0.100	<0.100	<0.100	<0.100
CR(VI)	--	--	--	--	0.0050	--	--	<0.0100	<0.0100	<0.0100	<0.0100
CU	--	--	--	--	0.0070	0.0070	0.0050	0.0040	0.0040	0.0030	0.0140
FE	--	--	--	--	<0.0500	<0.0500	<0.100	<0.0500	0.360	0.110	20.0
HARD	--	--	49.0	--	881	146	250	742	717	111	184
HG	--	--	--	--	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
I	--	--	--	--	<1.00	<0.0500	<0.0500	<0.0200	<0.0200	<0.0050	<0.0050
K	--	--	3.90	--	38.0	4.20	9.50	35.0	35.0	5.90	8.10
MG	--	--	2.70	--	55.0	8.80	18.0	48.0	48.0	7.20	13.0
MN	--	--	--	--	<0.0200	<0.0200	<0.0200	<0.0500	0.0400	<0.0500	0.420
MO	--	--	--	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
NA	--	--	14.0	--	835	2.70	98.0	640	640	28.0	28.0
NI	--	--	--	--	0.0120	<0.0050	0.0050	<0.0050	<0.0050	<0.0050	0.0120
NO3	--	--	--	--	13.0	21.0	8.00	11.0	9.73	1.20	2.13
PB	--	--	--	--	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.0160
PH	--	--	7.20	--	8.10	7.90	8.20	8.20	8.20	8.10	7.80
SE	--	--	--	--	0.0220	<0.0020	<0.0020	0.0030	0.0030	<0.0010	<0.0010
SIO2	--	--	--	--	2.30	2.40	6.40	4.88	4.36	4.24	4.00
SO4	--	--	14.0	--	450	61.0	110	330	320	40.0	41.0
SR	--	--	--	--	5.50	0.200	0.590	2.85	2.85	0.220	0.280
TDS105	--	--	--	--	3410	262	590	2800	2860	240	250
TI	--	--	--	--	<10.0	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	--	10.0	9.00	16.0	7.00	7.00	12.0	13.0
TSS105	--	--	--	--	--	--	53.0	11.0	11.0	--	24.0
U	--	--	--	--	<0.300	<0.0200	<0.0010	<0.0500	<0.0500	<0.0500	<0.0500
V	--	--	--	--	<0.100	0.0030	<0.500	<0.0200	<0.0200	<0.0050	0.0180
ZN	--	--	--	--	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0700

* Unfiltered sample dated one day after actual sampling.

Table III (Cont)

Chemical Characteristics of Canada Brick Quarry Surface Water

Location DSC

Date	840217	840218*	840930	841001*	850702	850703*	851005	851006*	860618	860619*
AG	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	0.0020	<0.0002	<0.0002	<0.0002	<0.0002
AL	0.500	10.0	<0.500	2.80	<1.00	<1.00	<1.00	2.90	<1.00	2.70
ALKCO3	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
ALKHCO3	40.0	52.0	104	108	137	138	91.0	92.0	186	188
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	0.0030	<0.0010	<0.0010
B	0.0600	0.0600	0.160	0.230	3.19	3.19	0.230	0.290	0.270	0.290
BA	<1.00	<1.00	<2.00	<2.00	<7.00	<5.00	<0.500	<0.500	<0.500	<0.500
BE	--	--	--	--	--	--	--	--	--	--
BR	<0.100	<0.100	0.700	0.300	13.0	12.0	<0.100	0.400	0.500	0.600
CA	22.1	35.0	51.1	41.5	267	263	42.9	43.9	73.5	75.0
CD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	<0.0002	<0.0002
CL	64.9	68.1	140	133	1340	1470	54.8	56.6	217	213
CO	--	--	--	--	--	--	--	--	--	--
COND	36.0	38.0	74.0	74.0	500	500	48.5	48.5	123	123
CR	<0.0500	<0.0500	<0.100	<0.100	<0.100	<0.100	<0.100	0.100	<0.100	<0.100
CR(VI)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0100	<0.0100
CU	0.0030	0.0190	0.0040	0.0080	0.0100	0.0040	0.0030	0.0060	0.0140	0.0140
FE	0.0600	17.5	<0.100	1.57	<0.0500	0.0950	0.0500	2.49	<0.0500	2.00
HARD	74.0	164	180	159	892	891	146	152	270	280
HG	<0.0002	<0.0002	0.0010	0.0007	0.0002	0.0002	<0.0002	0.0004	<0.0002	<0.0002
I	<0.0500	<0.0500	<0.0600	0.350	<0.200	<0.100	<0.0500	<0.0700	<0.100	<0.300
K	3.40	9.70	6.96	8.18	43.2	39.8	5.98	6.25	6.10	7.20
MG	4.60	11.1	12.9	13.7	54.9	57.0	9.46	10.5	21.2	22.5
MN	0.0700	0.490	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.0500	<0.0500	<0.0500
MO	<0.500	<0.500	<0.500	<0.500	1.45	1.45	<0.500	<0.500	<0.500	<0.500
NA	39.0	37.0	78.9	61.9	712	719	42.7	39.7	129	132
NI	<0.0050	0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0050	0.0060	<0.0050	0.0050
NO3	3.87	4.88	0.180	0.130	--	85.1	3.49	3.96	2.71	2.71
PB	<0.0020	0.0110	<0.0020	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020	<0.0050	<0.0050
PH	7.40	7.60	7.80	7.70	8.30	8.30	7.60	7.40	8.30	8.10
SE	<0.0010	<0.0010	<0.0010	<0.0010	0.0030	0.0030	0.0020	0.0040	<0.0010	<0.0010
SIO2	2.94	103	2.70	11.5	3.41	3.56	1.10	11.7	2.35	--
SO4	20.1	19.5	54.0	53.4	788	880	57.2	57.3	85.0	78.0
SR	0.120	0.170	0.500	0.970	6.01	6.01	0.290	0.430	0.720	0.780
TDS105	228	246	466	462	3310	3270	266	283	600	630
TI	<1.00	<1.00	<1.00	1.30	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	12.2	12.7	24.0	26.0	23.5	22.0	9.00	11.0	23.0	28.0
TSS105	--	630	--	--	--	24.1	--	11.0	--	--
U	<0.0100	<0.0100	<0.0500	<0.0500	<0.100	<0.100	<0.0500	<0.0200	0.0200	<0.0200
V	<0.0050	0.0700	<0.0100	<0.0100	<0.100	<0.0500	<1.00	<1.00	<0.0100	<0.0200
ZN	<0.0200	0.0500	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0200	<0.0200	<0.0200

* Unfiltered sample dated one day after actual sampling.

Table IV

Chemical Characteristics of Canada Brick Quarry Surface Water

Location PSB

Date	800507	811130	820314	820324	820813	820827	820924	830921	830922*	831017	831018*
AG	--	<0.0002	--	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	--	<0.200	--	<0.200	<0.600	<0.200	<0.500	<0.500	<0.500	<0.500	13.0
ALKCO3	--	--	--	<5.00	19.0	<5.00	9.00	22.0	27.0	<5.00	<5.00
ALKHCO3	--	110	--	86.0	160	65.0	133	127	122	72.0	87.0
ALKOH	--	--	--	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	--	0.0010	--	<0.0010	<0.0010	<0.0020	<0.0020	0.0010	0.0010	0.0030	<0.0010
B	--	<0.500	--	<1.00	<0.500	<0.500	<1.00	1.66	1.71	0.200	0.150
BA	--	<1.00	--	<2.00	<8.00	1.00	1.40	<2.00	<2.00	<1.00	<1.00
BE	--	--	--	--	<0.0002	<0.0002	<0.0002	--	--	--	--
BR	--	0.100	--	<0.200	1.60	0.300	0.600	11.0	10.0	0.210	<0.0500
CA	--	58.0	--	34.0	97.0	43.0	70.0	220	223	30.0	38.0
CD	--	0.0010	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
CL	--	46.0	--	50.0	242	38.0	165	1100	1060	36.0	35.0
CO	--	--	--	--	--	--	<0.0500	--	--	--	--
COND	--	48.0	--	39.0	141	41.0	79.0	420	420	35.0	35.2
CR	--	<0.100	--	<0.0500	<0.0500	0.0040	<0.0500	<0.100	<0.100	<0.100	<0.100
CR(VI)	--	0.0050	--	0.0070	0.0040	--	--	<0.0100	<0.0100	<0.0100	<0.0100
CU	--	0.0030	--	0.0050	0.0130	0.0120	0.0070	0.0050	0.0040	0.0030	0.0140
FE	--	<0.0500	--	0.0500	<0.0500	<0.0500	<0.100	<0.0500	0.230	0.380	20.0
HARD	--	211	--	120	333	143	250	759	770	93.0	184
HG	--	--	--	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
I	--	<0.0100	--	<0.0200	<0.200	<0.0500	<0.0500	<0.0200	<0.0200	<0.0050	<0.0050
K	--	5.80	--	4.70	11.0	4.20	6.20	29.0	29.0	5.90	7.90
MG	--	16.0	--	8.10	22.0	8.70	18.0	51.0	52.0	6.70	13.0
MN	--	<0.0200	--	<0.100	<0.0200	<0.0200	<0.0200	<0.0500	<0.0500	<0.0500	0.400
MO	--	<0.500	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
NA	--	26.0	--	30.0	173	2.70	55.0	570	570	27.0	28.0
NI	--	<0.0050	--	<0.0050	<0.0050	<0.0050	0.0100	<0.0050	<0.0050	<0.0050	0.0120
NO3	--	0.500	--	0.100	3.00	20.0	8.00	7.90	7.68	1.78	2.00
PB	--	0.0090	--	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	0.0170
PH	--	8.10	--	7.90	8.30	7.90	8.00	8.30	8.20	8.00	7.80
SE	--	<0.0010	--	<0.0010	0.0040	<0.0020	<0.0020	0.0020	0.0020	<0.0010	<0.0010
SIO2	--	15.0	--	2.60	3.70	4.10	6.20	5.62	5.09	3.66	3.66
SO4	--	74.0	--	24.0	175	59.0	140	310	290	38.0	37.0
SR	--	0.130	--	0.140	1.12	0.200	0.400	2.50	2.50	0.220	0.270
TDS105	--	370	--	236	848	242	490	2700	2730	220	230
TI	--	<0.500	--	<1.00	<2.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	--	--	--	14.0	17.0	10.0	16.0	5.00	2.00	13.0	12.0
TSS105	--	48.0	--	--	--	--	34.0	7.00	7.00	--	75.0
U	--	<0.0100	--	<0.0100	<0.0600	<0.0200	<0.0010	<0.0500	<0.0500	<0.0500	<0.0500
V	--	<0.0050	--	<0.0100	<0.0200	<0.0030	<0.500	<0.0200	<0.0200	<0.0050	0.0110
ZN	--	<0.0200	--	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0700

* Unfiltered sample dated one day after actual sampling.

Table IV (Cont)

Chemical Characteristics of Canada Brick Quarry Surface Water

Location PSB

Date	840217	840218*	840930	841001*	850702	850703*	851005	851006*	860618	860619*
AG	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
AL	<0.500	12.0	<0.500	1.80	<1.00	<1.00	<1.00	2.70	<1.00	3.90
ALKCO3	<5.00	<5.00	12.0	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
ALKHCO3	40.0	55.0	129	140	160	161	90.0	107	203	205
ALKOH	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
AS	<0.0010	0.0030	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	0.0030	<0.0010	<0.0010
B	0.0700	0.0600	0.330	0.350	2.45	2.44	0.220	0.250	0.270	0.320
BA	<1.00	<1.00	<2.00	<2.00	<6.00	<5.00	<0.500	<0.500	<0.500	<0.500
BE	--	--	--	--	--	--	--	--	--	--
BR	<0.100	<0.100	0.900	0.600	10.0	9.00	0.100	0.200	0.500	0.800
CA	22.6	41.0	63.5	66.5	239	236	50.3	52.6	80.0	82.0
CD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	<0.0002	<0.0002
CL	65.4	66.7	140	138	1070	1080	62.3	63.1	217	214
CO	--	--	--	--	--	--	--	--	--	--
COND	36.0	38.0	86.0	86.0	440	440	54.5	55.0	124	125
CR	<0.0500	<0.0500	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
CR(VI)	<0.0100	<0.0100	<0.0100	<0.0100	<0.0050	<0.0050	<0.0100	<0.0100	<0.0100	<0.0100
CU	0.0030	0.0230	0.0040	0.0060	0.0100	0.0060	0.0050	0.0060	0.0120	0.0140
FE	0.0600	21.6	<0.100	1.08	<0.0500	0.395	0.100	2.56	<0.0500	3.00
HARD	75.0	194	223	235	805	804	170	6.73	293	305
HG	<0.0002	<0.0002	0.0008	0.0006	0.0003	<0.0002	<0.0002	0.0006	<0.0002	<0.0002
I	<0.0500	<0.0500	<0.0600	<0.0600	<0.200	<0.100	<0.0500	<0.0500	<0.100	<0.300
K	3.50	8.70	9.21	10.3	34.1	31.8	6.31	181	7.30	8.70
MG	4.60	13.0	15.8	16.7	50.9	52.3	10.9	12.2	22.7	24.2
MN	0.0800	0.650	<0.0050	<0.0500	<0.0500	<0.0500	<0.0500	0.0500	<0.0500	0.0700
MO	<0.500	<0.500	<0.500	<0.500	1.00	1.00	<0.500	<0.500	<0.500	<0.500
NA	40.0	38.0	87.4	86.6	605	615	45.1	44.2	134	135
NI	<0.0050	0.0100	<0.0050	<0.0050	<0.0100	<0.0100	0.0050	<0.0050	<0.0050	0.0050
NO3	3.94	5.01	0.180	0.130	--	70.0	4.38	4.24	5.81	6.14
PB	<0.0020	0.0230	<0.0020	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020	<0.0050	<0.0050
PH	7.50	7.60	8.00	7.80	8.30	8.20	7.50	7.60	8.20	8.10
SE	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	0.0020	0.0030	0.0020	<0.0010	0.0020
SIO2	3.39	126	5.30	8.30	1.55	3.86	0.270	3.37	5.80	6.85
SO4	18.6	19.5	74.0	81.0	599	608	64.2	64.3	105	95.0
SR	0.120	0.200	1.07	1.00	5.00	5.00	0.170	0.190	0.950	0.940
TDS105	228	250	520	516	2830	2790	326	304	590	680
TI	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
TOC	11.5	10.6	25.0	27.0	21.0	26.0	11.0	12.0	26.0	28.0
TSS105	--	920	--	--	--	1.60	--	5.00	--	--
U	<0.0100	<0.0100	<0.0500	<0.0500	<0.100	<0.100	<0.0500	0.0300	0.0200	0.0400
V	<0.0050	0.0800	<0.0100	<0.0100	<0.100	<0.0500	<1.00	<1.00	<0.0100	<0.0200
ZN	<0.0200	0.100	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0200	0.0400	0.190

* Unfiltered sample dated one day after actual sampling.

APPENDIX C

CANADA BRICK QUARRY SURFACE WATER

(MARY FIX CREEK)

MAJOR ION BALANCES

1980-1986

Sample Locations

CPO = CP Overpass
SPF = South Property Fence
DSC = Dundas Street Culvert
PSB = Paisley Street Bridge

EPM = equivalents per million

Table V

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location CPO

Cations

Date	Number	Calcium			Magnesium			Sodium			Potassium			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Cation	Anion	
800507	1	81.00	4.04	45.86	24.40	2.01	22.78	60.00	2.61	29.61	6.00	0.15	1.74	8.81	9.58	
811130	2	57.00	2.84	55.16	16.00	1.32	25.53	20.00	0.87	16.87	4.90	0.13	2.43	5.16	4.78	
820314	3	15.00	0.75	42.37	2.70	0.22	12.58	16.00	0.70	39.40	3.90	0.10	5.65	1.77	1.74	
820324	4	34.00	1.70	46.30	8.30	0.68	18.64	27.00	1.17	32.05	4.30	0.11	3.00	3.66	3.95	
820813	5	116.00	5.79	44.84	34.00	2.80	21.68	97.00	4.22	32.69	4.00	0.10	0.79	12.91	13.19	
820827	6	43.00	2.15	62.27	8.40	0.69	20.06	12.00	0.52	15.15	3.40	0.09	2.52	3.45	2.92	
820924	7	72.00	3.59	53.80	18.00	1.48	22.18	34.00	1.48	22.15	4.90	0.13	1.88	6.68	7.31	
830921	8	89.00	4.44	47.46	22.00	1.81	19.35	71.00	3.09	33.01	0.66	0.02	0.18	9.36	9.14	
830922	9	88.00	4.39	46.77	23.00	1.89	20.16	71.00	3.09	32.89	0.67	0.02	0.18	9.39	9.40	
831017	10	29.00	1.45	52.86	5.70	0.47	17.13	16.00	0.70	25.42	4.90	0.13	4.58	2.74	2.58	
831018	11	31.00	1.55	50.79	7.80	0.64	21.07	16.00	0.70	22.85	6.30	0.16	5.29	3.05	2.64	
840217	12	21.40	1.07	35.32	4.30	0.35	11.70	35.00	1.52	50.35	3.10	0.08	2.62	3.02	2.83	
840218	13	26.90	1.34	37.31	7.70	0.63	17.61	33.00	1.44	39.89	7.30	0.19	5.19	3.60	3.15	
840930	14	34.70	1.73	39.67	12.20	1.00	23.00	34.60	1.51	34.48	4.87	0.12	2.85	4.37	5.75	*
841001	15	46.10	2.30	41.46	12.50	1.03	18.54	47.80	2.08	37.47	5.49	0.14	2.53	5.55	5.72	
850702	16	130.00	6.49	27.61	40.70	3.35	14.26	310.00	13.48	57.40	6.75	0.17	0.73	23.49	25.53	
850703	17	129.00	6.44	27.27	41.20	3.39	14.36	313.00	13.61	57.67	6.48	0.17	0.70	23.61	23.43	
851005	18	39.10	1.95	48.05	8.93	0.73	18.10	28.90	1.26	30.96	4.61	0.12	2.90	4.06	4.17	
851006	19	40.90	2.04	47.89	9.96	0.82	19.23	29.30	1.27	29.91	4.95	0.13	2.97	4.26	3.77	
860618	20	74.00	3.69	36.30	21.70	1.79	17.55	105.00	4.57	44.89	5.00	0.13	1.26	10.17	10.60	
860619	21	88.00	4.39	37.27	32.50	2.67	22.70	104.00	4.52	38.40	7.50	0.19	1.63	11.78	10.63	

* Indicates that cations and anions do not lie within 10% of mean

Table V (cont)

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location CP0

Anions

Date	Number	Chloride			Sulphate			Bicarbonate as CaCO3			Carbonate as CaCO3			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Anion	Cation	
800507	1	136.00	3.84	40.04	81.00	1.69	17.60	201.00	4.02	41.94	2.00	0.04	0.42	9.58	8.81	
811130	2	40.00	1.13	23.58	70.00	1.46	30.46	110.00	2.20	45.96	0.00	0.00	0.00	4.78	5.16	
820314	3	26.00	0.73	42.04	14.00	0.29	16.71	36.00	0.72	41.25	-5.00	0.00	0.00	1.74	1.77	
820324	4	60.00	1.69	42.81	26.00	0.54	13.69	86.00	1.72	43.49	-5.00	0.00	0.00	3.95	3.66	
820813	5	177.00	4.99	37.86	140.00	2.91	22.11	240.00	4.80	36.39	24.00	0.48	3.64	13.19	12.91	
820827	6	22.00	0.62	21.25	49.00	1.02	34.94	64.00	1.28	43.81	-5.00	0.00	0.00	2.92	3.45	
820924	7	85.00	2.40	32.78	95.00	1.98	27.04	137.00	2.74	37.45	10.00	0.20	2.73	7.31	6.68	
830921	8	120.00	3.38	37.03	95.00	1.98	21.64	163.00	3.26	35.65	26.00	0.52	5.69	9.14	9.36	
830922	9	130.00	3.67	39.00	94.00	1.96	20.81	165.00	3.30	35.08	24.00	0.48	5.10	9.40	9.39	
831017	10	24.00	0.68	26.23	30.00	0.62	24.20	64.00	1.28	49.57	-5.00	0.00	0.00	2.58	2.74	
831018	11	24.00	0.68	25.64	29.00	0.60	22.87	68.00	1.36	51.49	-5.00	0.00	0.00	2.64	3.05	
840217	12	61.50	1.73	61.20	17.30	0.36	12.71	37.00	0.74	26.10	-5.00	0.00	0.00	2.83	3.02	
840218	13	66.10	1.86	59.28	18.30	0.38	12.11	45.00	0.90	28.60	-5.00	0.00	0.00	3.15	3.60	
840930	14	99.00	2.79	48.58	44.00	0.92	15.94	95.00	1.90	33.04	7.00	0.14	2.43	5.75	4.37	*
841001	15	98.00	2.76	48.34	43.00	0.90	15.66	103.00	2.06	36.01	-5.00	0.00	0.00	5.72	5.55	
850702	16	639.00	18.02	70.61	151.00	3.14	12.32	218.00	4.36	17.07	-5.00	0.00	0.00	25.53	23.49	
850703	17	572.00	16.13	68.87	140.00	2.91	12.44	219.00	4.38	18.69	-5.00	0.00	0.00	23.43	23.61	
851005	18	43.60	1.23	29.49	38.50	0.80	19.22	107.00	2.14	51.29	-5.00	0.00	0.00	4.17	4.06	
851006	19	42.20	1.19	31.54	37.70	0.78	20.80	90.00	1.80	47.67	-5.00	0.00	0.00	3.77	4.26	
860618	20	193.00	5.44	51.37	67.00	1.39	13.16	188.00	3.76	35.47	-5.00	0.00	0.00	10.60	10.17	
860619	21	192.00	5.42	50.94	70.00	1.46	13.71	188.00	3.76	35.35	-5.00	0.00	0.00	10.63	11.78	

* Indicates that cations and anions do not lie within 10% of mean

Table VI

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location SPF

Cations

Date	Number	Calcium			Magnesium			Sodium			Potassium			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Cation	Anion	
800507	1	79.00	3.94	45.84	22.80	1.88	21.82	61.00	2.65	30.85	5.00	0.13	1.49	8.60	8.98	
811130	2	57.00	2.84	52.38	16.00	1.32	24.25	26.00	1.13	20.83	5.40	0.14	2.54	5.43	4.88	
820314	3	17.00	0.85	41.41	3.30	0.27	13.26	19.00	0.83	40.34	4.00	0.10	4.99	2.05	2.05	
820324	4	33.00	1.65	45.13	8.10	0.67	18.27	28.00	1.22	33.38	4.60	0.12	3.22	3.65	3.69	
820813	5	259.00	12.92	22.44	54.00	4.44	7.72	900.00	39.15	67.98	42.00	1.07	1.87	57.59	59.58	
820827	6	45.00	2.25	70.52	8.60	0.71	22.22	2.90	0.13	3.96	4.10	0.10	3.29	3.18	3.73	
820924	7	72.00	3.59	36.32	18.00	1.48	14.97	105.00	4.57	46.17	9.80	0.25	2.53	9.89	11.74	
830921	8	207.00	10.33	24.35	46.00	3.79	8.92	630.00	27.40	64.61	35.00	0.90	2.11	42.41	43.34	
830922	9	208.00	10.38	24.15	47.00	3.87	9.00	640.00	27.84	64.77	35.00	0.90	2.08	42.98	41.38	
831017	10	29.00	1.45	44.09	6.10	0.50	15.29	27.00	1.17	35.78	6.20	0.16	4.83	3.28	3.12	
831018	11	40.00	2.00	39.51	20.00	1.65	32.58	27.00	1.17	23.25	9.20	0.24	4.66	5.05	3.62	*
840217	12	22.00	1.10	32.05	4.50	0.37	10.81	43.00	1.87	54.60	3.40	0.09	2.54	3.43	3.01	
840218	13	35.00	1.75	39.80	10.50	0.86	19.69	36.00	1.57	35.68	8.30	0.21	4.84	4.39	3.29	*
840930	14	35.70	1.78	38.32	7.50	0.62	13.27	49.40	2.15	46.22	3.98	0.10	2.19	4.65	6.63	*
841001	15	49.90	2.49	38.31	9.60	0.79	12.16	70.80	3.08	47.39	5.45	0.14	2.14	6.50	6.34	
850702	16	261.00	13.02	26.06	55.90	4.60	9.20	720.00	31.32	62.67	40.40	1.03	2.07	49.98	58.78	
850703	17	264.00	13.17	26.03	58.60	4.82	9.53	725.00	31.54	62.30	42.50	1.09	2.15	50.62	54.66	
851005	18	41.40	2.07	43.50	9.19	0.76	15.92	40.80	1.77	37.37	5.95	0.15	3.20	4.75	4.42	
851006	19	42.50	2.12	44.32	10.20	0.84	17.54	38.30	1.67	34.82	6.21	0.16	3.32	4.78	4.41	
860618	20	72.70	3.63	32.46	21.20	1.74	15.61	130.00	5.65	50.59	5.87	0.15	1.34	11.18	11.57	
860619	21	75.00	3.74	32.53	23.20	1.91	16.59	130.00	5.65	49.15	7.80	0.20	1.73	11.51	11.53	

* Indicates that cations and anions do not lie within 10% of mean

Table VI (cont)

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location SPF

Anions

Date	Number	Chloride			Sulphate			Bicarbonate as CaCO3			Carbonate as CaCO3			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Anion	Cation	
800507	1	122.00	3.44	38.34	78.00	1.62	18.09	190.00	3.80	42.32	5.60	0.11	1.25	8.98	8.60	
811130	2	42.00	1.18	24.26	72.00	1.50	30.70	110.00	2.20	45.04	0.00	0.00	0.00	4.88	5.43	
820314	3	34.00	0.96	46.78	14.00	0.29	14.22	40.00	0.80	39.01	-5.00	0.00	0.00	2.05	2.05	
820324	4	55.00	1.55	42.05	23.00	0.48	12.98	83.00	1.66	44.97	-5.00	0.00	0.00	3.69	3.65	
820813	5	1700.00	47.95	80.48	450.00	9.37	15.73	99.00	1.98	3.32	14.00	0.28	0.47	59.58	57.59	
820827	6	41.00	1.16	31.02	63.00	1.31	35.19	63.00	1.26	33.79	-5.00	0.00	0.00	3.73	3.18	
820924	7	215.00	6.06	51.65	145.00	3.02	25.71	120.00	2.40	20.43	13.00	0.26	2.21	11.74	9.89	
830921	8	1200.00	33.85	78.10	330.00	6.87	15.85	117.00	2.34	5.40	14.00	0.28	0.65	43.34	42.41	
830922	9	1130.00	31.87	77.02	330.00	6.87	16.60	107.00	2.14	5.17	25.00	0.50	1.21	41.38	42.98	
831017	10	35.00	0.99	31.66	38.00	0.79	25.38	67.00	1.34	42.96	-5.00	0.00	0.00	3.12	3.28	
831018	11	35.00	0.99	27.30	36.00	0.75	20.73	94.00	1.88	51.97	-5.00	0.00	0.00	3.62	5.05	*
840217	12	65.40	1.84	61.29	18.50	0.39	12.80	39.00	0.78	25.91	-5.00	0.00	0.00	3.01	3.43	
840218	13	66.60	1.88	57.16	19.60	0.41	12.42	50.00	1.00	30.42	-5.00	0.00	0.00	3.29	4.39	*
840930	14	125.00	3.53	53.21	50.00	1.04	15.71	94.00	1.88	28.36	9.00	0.18	2.72	6.63	4.65	*
841001	15	118.00	3.33	52.52	45.60	0.95	14.98	103.00	2.06	32.49	-5.00	0.00	0.00	6.34	6.50	
850702	16	1420.00	40.05	68.14	768.00	15.99	27.20	137.00	2.74	4.66	-5.00	0.00	0.00	58.78	49.98	
850703	17	1310.00	36.95	67.60	718.00	14.95	27.35	138.00	2.76	5.05	-5.00	0.00	0.00	54.66	50.62	
851005	18	51.10	1.44	32.64	58.40	1.22	27.53	88.00	1.76	39.83	-5.00	0.00	0.00	4.42	4.75	
851006	19	51.50	1.45	32.96	55.50	1.16	26.22	90.00	1.80	40.82	-5.00	0.00	0.00	4.41	4.78	
860618	20	215.00	6.06	52.40	85.00	1.77	15.29	187.00	3.74	32.30	-5.00	0.00	0.00	11.57	11.18	
860619	21	210.00	5.92	51.36	88.00	1.83	15.89	189.00	3.78	32.76	-5.00	0.00	0.00	11.53	11.51	

* Indicates that cations and anions do not lie within 10% of mean

Table VII

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location DSC

Cations

Date	Number	Calcium			Magnesium			Sodium			Potassium			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Cation	Anion	
820314	1	15.00	0.75	0.45	2.70	0.22	13.23	14.00	0.61	36.26	3.90	0.10	5.94	1.68	1.74	
820813	2	262.00	13.07	0.24	55.00	4.53	8.24	835.00	36.32	66.17	38.00	0.97	1.77	54.89	55.97	
820827	3	44.00	2.20	0.70	8.80	0.72	23.03	2.70	0.12	3.73	4.20	0.11	3.42	3.14	3.66	
820924	4	70.00	3.49	0.37	18.00	1.48	15.62	98.00	4.26	44.97	9.50	0.24	2.56	9.48	9.62	
830921	5	214.00	10.68	0.25	48.00	3.95	9.11	640.00	27.84	64.20	35.00	0.90	2.06	43.36	43.44	
830922	6	208.00	10.38	0.24	48.00	3.95	9.17	640.00	27.84	64.65	35.00	0.90	2.08	43.06	38.45	
831017	7	33.00	1.65	0.46	7.20	0.59	16.42	28.00	1.22	33.76	5.90	0.15	4.18	3.61	3.46	
831018	8	38.00	1.90	0.43	13.00	1.07	24.36	28.00	1.22	27.74	8.10	0.21	4.72	4.39	3.77	
840217	9	22.10	1.10	0.34	4.60	0.38	11.59	39.00	1.70	51.96	3.40	0.09	2.66	3.26	3.05	
840218	10	35.00	1.75	0.39	11.10	0.91	20.22	37.00	1.61	35.63	9.70	0.25	5.49	4.52	3.37	*
840930	11	51.10	2.55	0.35	12.90	1.06	14.70	78.90	3.43	47.52	6.96	0.18	2.47	7.22	7.15	
841001	12	41.50	2.07	0.34	13.70	1.13	18.48	61.90	2.69	44.14	8.18	0.21	3.43	6.10	7.02	
850702	13	267.00	13.32	0.27	54.90	4.52	9.05	712.00	30.97	62.04	43.20	1.10	2.21	49.92	56.94	
850703	14	263.00	13.12	0.26	57.00	4.69	9.36	719.00	31.27	62.42	39.80	1.02	2.03	50.11	62.54	*
851005	15	42.90	2.14	0.43	9.46	0.78	15.79	42.70	1.86	37.68	5.98	0.15	3.10	4.93	4.56	
851006	16	43.90	2.19	0.44	10.50	0.86	17.49	39.70	1.73	34.95	6.25	0.16	3.24	4.94	4.63	
860618	17	73.50	3.67	0.33	21.20	1.74	15.60	129.00	5.61	50.19	6.10	0.16	1.40	11.18	11.61	
860619	18	75.00	3.74	0.32	22.50	1.85	16.07	132.00	5.74	49.84	7.20	0.18	1.60	11.52	11.39	

* Indicates that cations and anions do not lie within 10% of mean

Table VII (cont)

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location DSC

Anions

Date	Number	Chloride			Sulphate			Bicarbonate as CaCO3			Carbonate as CaCO3			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Anion	Cation	
820314	1	26.00	0.73	42.04	14.00	0.29	16.71	36.00	0.72	41.25	-5.00	0.00	0.00	1.74	1.68	
820813	2	1575.00	44.43	79.37	450.00	9.37	16.74	92.00	1.84	3.29	17.00	0.34	0.61	55.97	54.89	
820827	3	38.00	1.07	29.27	61.00	1.27	34.69	66.00	1.32	36.04	-5.00	0.00	0.00	3.66	3.14	
820924	4	165.00	4.65	48.36	110.00	2.29	23.80	121.00	2.42	25.14	13.00	0.26	2.70	9.62	9.48	
830921	5	1200.00	33.85	77.92	330.00	6.87	15.82	121.00	2.42	5.57	15.00	0.30	0.69	43.44	43.36	
830922	6	1030.00	29.05	75.55	320.00	6.66	17.33	110.00	2.20	5.72	27.00	0.54	1.40	38.45	43.06	
831017	7	40.00	1.13	32.60	40.00	0.83	24.07	75.00	1.50	43.33	-5.00	0.00	0.00	3.46	3.61	
831018	8	39.00	1.10	29.16	41.00	0.85	22.63	91.00	1.82	48.22	-5.00	0.00	0.00	3.77	4.39	
840217	9	64.90	1.83	60.04	20.10	0.42	13.73	40.00	0.80	26.23	-5.00	0.00	0.00	3.05	3.26	
840218	10	68.10	1.92	57.06	19.50	0.41	12.06	52.00	1.04	30.88	-5.00	0.00	0.00	3.37	4.52	*
840930	11	140.00	3.95	55.21	54.00	1.12	15.72	104.00	2.08	29.07	-5.00	0.00	0.00	7.15	7.22	
841001	12	133.00	3.75	53.42	53.40	1.11	15.83	108.00	2.16	30.75	-5.00	0.00	0.00	7.02	6.10	
850702	13	1340.00	37.80	66.38	788.00	16.41	28.81	137.00	2.74	4.81	-5.00	0.00	0.00	56.94	49.92	
850703	14	1470.00	41.46	66.29	880.00	18.32	29.29	138.00	2.76	4.41	-5.00	0.00	0.00	62.54	50.11	*
851005	15	54.80	1.55	33.93	57.20	1.19	26.14	91.00	1.82	39.93	-5.00	0.00	0.00	4.56	4.93	
851006	16	56.60	1.60	34.49	57.30	1.19	25.77	92.00	1.84	39.74	-5.00	0.00	0.00	4.63	4.94	
860618	17	217.00	6.12	52.72	85.00	1.77	15.24	186.00	3.72	32.03	-5.00	0.00	0.00	11.61	11.18	
860619	18	213.00	6.01	52.75	78.00	1.62	14.26	188.00	3.76	33.00	-5.00	0.00	0.00	11.39	11.52	

* Indicates that cations and anions do not lie within 10% of mean

Table VIII

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location PSB

Cations

Date	Number	Calcium			Magnesium			Sodium			Potassium			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Cation	Anion	
811130	1	58.00	2.89	0.53	16.00	1.32	23.98	26.00	1.13	20.60	5.80	0.15	2.70	5.49	5.04	
820324	2	34.00	1.70	0.45	8.10	0.67	17.59	30.00	1.30	34.45	4.70	0.12	3.17	3.79	3.63	
820813	3	97.00	4.84	0.33	22.00	1.81	12.52	173.00	7.53	52.05	11.00	0.28	1.95	14.46	14.05	
820827	4	43.00	2.15	0.70	8.70	0.72	23.19	2.70	0.12	3.81	4.20	0.11	3.48	3.09	3.60	
820924	5	70.00	3.49	0.46	18.00	1.48	19.68	55.00	2.39	31.79	6.20	0.16	2.11	7.53	10.41	*
830921	6	220.00	10.98	0.27	51.00	4.20	10.31	570.00	24.79	60.90	29.00	0.74	1.82	40.71	40.46	
830922	7	223.00	11.13	0.27	52.00	4.28	10.45	570.00	24.79	60.56	29.00	0.74	1.81	40.94	38.92	
831017	8	30.00	1.50	0.44	6.70	0.55	16.34	27.00	1.17	34.81	5.90	0.15	4.47	3.37	3.25	
831018	9	38.00	1.90	0.43	13.00	1.07	24.39	28.00	1.22	27.77	7.90	0.20	4.61	4.39	3.50	*
840217	10	22.60	1.13	0.34	4.60	0.38	11.35	40.00	1.74	52.16	3.50	0.09	2.68	3.34	3.03	
840218	11	41.00	2.05	0.41	13.00	1.07	21.43	38.00	1.65	33.12	8.70	0.22	4.46	4.99	3.39	*
840930	12	63.50	3.17	0.37	15.80	1.30	15.28	87.40	3.80	44.69	9.21	0.24	2.77	8.51	8.31	
841001	13	66.50	3.32	0.38	16.70	1.37	15.75	86.60	3.77	43.18	10.30	0.26	3.02	8.72	8.38	
850702	14	239.00	11.93	0.28	50.90	4.19	9.67	605.00	26.32	60.77	34.10	0.87	2.01	43.30	45.85	
850703	15	236.00	11.78	0.27	52.30	4.30	9.86	615.00	26.75	61.29	31.80	0.81	1.86	43.64	46.34	
851005	16	50.30	2.51	0.45	10.90	0.90	16.22	45.10	1.96	35.47	6.31	0.16	2.92	5.53	4.89	
851006	17	52.60	2.62	0.44	12.20	1.00	16.69	44.20	1.92	31.97	18.10	0.46	7.70	6.01	5.26	
860618	18	80.00	3.99	0.34	22.70	1.87	15.73	134.00	5.83	49.08	7.30	0.19	1.57	11.88	12.37	
860619	19	82.00	4.09	0.34	24.20	1.99	16.35	135.00	5.87	48.22	8.70	0.22	1.83	12.18	12.11	

* Indicates that cations and anions do not lie within 10% of mean

Table VIII (cont)

Major Ion Chemistry
Canada Brick Quarry Surface Water
Location PSB

Anions

Date	Number	Chloride			Sulphate			Bicarbonate as CaCO3			Carbonate as CaCO3			Total Ions (EPM)		
		mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	mg/L	EPM	%EPM	Anion	Cation	
811130	1	46.00	1.30	25.76	74.00	1.54	30.59	110.00	2.20	43.66	0.00	0.00	0.00	5.04	5.49	
820324	2	50.00	1.41	38.86	24.00	0.50	13.77	86.00	1.72	47.37	-5.00	0.00	0.00	3.63	3.79	
820813	3	242.00	6.83	48.59	175.00	3.64	25.94	160.00	3.20	22.77	19.00	0.38	2.70	14.05	14.46	
820827	4	38.00	1.07	29.78	59.00	1.23	34.12	65.00	1.30	36.10	-5.00	0.00	0.00	3.60	3.09	
820924	5	165.00	4.65	44.72	140.00	2.91	28.01	133.00	2.66	25.55	9.00	0.18	1.73	10.41	7.53	*
830921	6	1100.00	31.03	76.69	310.00	6.45	15.95	127.00	2.54	6.28	22.00	0.44	1.09	40.46	40.71	
830922	7	1060.00	29.90	76.83	290.00	6.04	15.52	122.00	2.44	6.27	27.00	0.54	1.39	38.92	40.94	
831017	8	36.00	1.02	31.28	38.00	0.79	24.37	72.00	1.44	44.34	-5.00	0.00	0.00	3.25	3.37	
831018	9	35.00	0.99	28.23	37.00	0.77	22.03	87.00	1.74	49.74	-5.00	0.00	0.00	3.50	4.39	*
840217	10	65.40	1.84	60.85	18.60	0.39	12.77	40.00	0.80	26.38	-5.00	0.00	0.00	3.03	3.34	
840218	11	66.70	1.88	55.55	19.50	0.41	11.99	55.00	1.10	32.46	-5.00	0.00	0.00	3.39	4.99	*
840930	12	140.00	3.95	47.53	74.00	1.54	18.54	129.00	2.58	31.04	12.00	0.24	2.89	8.31	8.51	
841001	13	138.00	3.89	46.46	81.00	1.69	20.13	140.00	2.80	33.41	-5.00	0.00	0.00	8.38	8.72	
850702	14	1070.00	30.18	65.82	599.00	12.47	27.20	160.00	3.20	6.98	-5.00	0.00	0.00	45.85	43.30	
850703	15	1080.00	30.46	65.74	608.00	12.66	27.32	161.00	3.22	6.95	-5.00	0.00	0.00	46.34	43.64	
851005	16	62.30	1.76	35.91	64.20	1.34	27.32	90.00	1.80	36.77	-5.00	0.00	0.00	4.89	5.53	
851006	17	63.10	1.78	33.85	64.30	1.34	25.46	107.00	2.14	40.69	-5.00	0.00	0.00	5.26	6.01	
860618	18	217.00	6.12	49.50	105.00	2.19	17.68	203.00	4.06	32.82	-5.00	0.00	0.00	12.37	11.88	
860619	19	214.00	6.04	49.83	95.00	1.98	16.33	205.00	4.10	33.84	-5.00	0.00	0.00	12.11	12.18	

* Indicates that cations and anions do not lie within 10% of mean

APPENDIX D

CANADA BRICK QUARRY SURFACE WATER

(MARY FIX CREEK)

PIPER DIAGRAMS

1980-1986

Sampling Locations

CPO = CP Overpass
SPF = South Property Fence
DSC = Dundas Street Culvert
PSB = Paisley Street Bridge

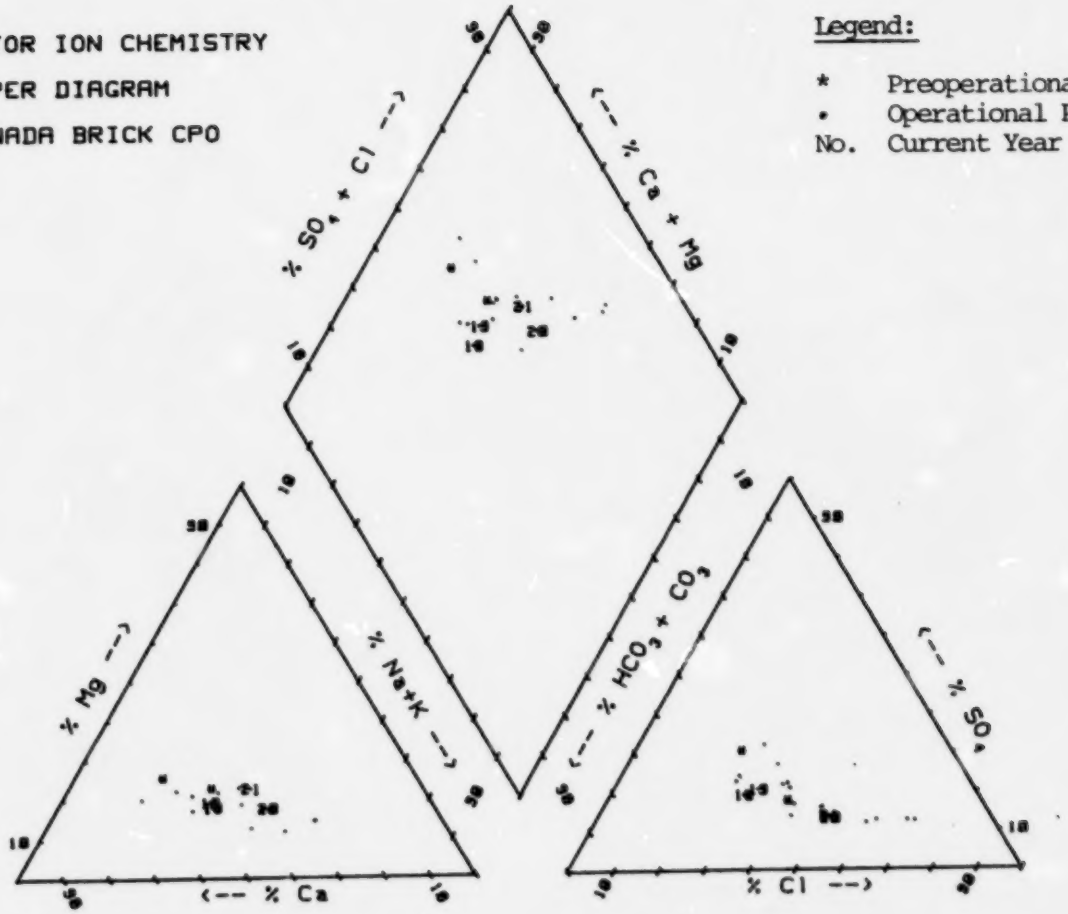
Symbols

* = water quality before ash placement commenced
• = water quality after ash placement commenced
No. = Corresponds to numbers on Major Ion Balances' tables (Appendix C) for specific 1985-86 sampling dates
EPM = equivalents per million

MAJOR ION CHEMISTRY

PIPER DIAGRAM

CANADA BRICK CPO



Legend:

* Preoperational Period - before December 1981

• Operational Period - after December 1981

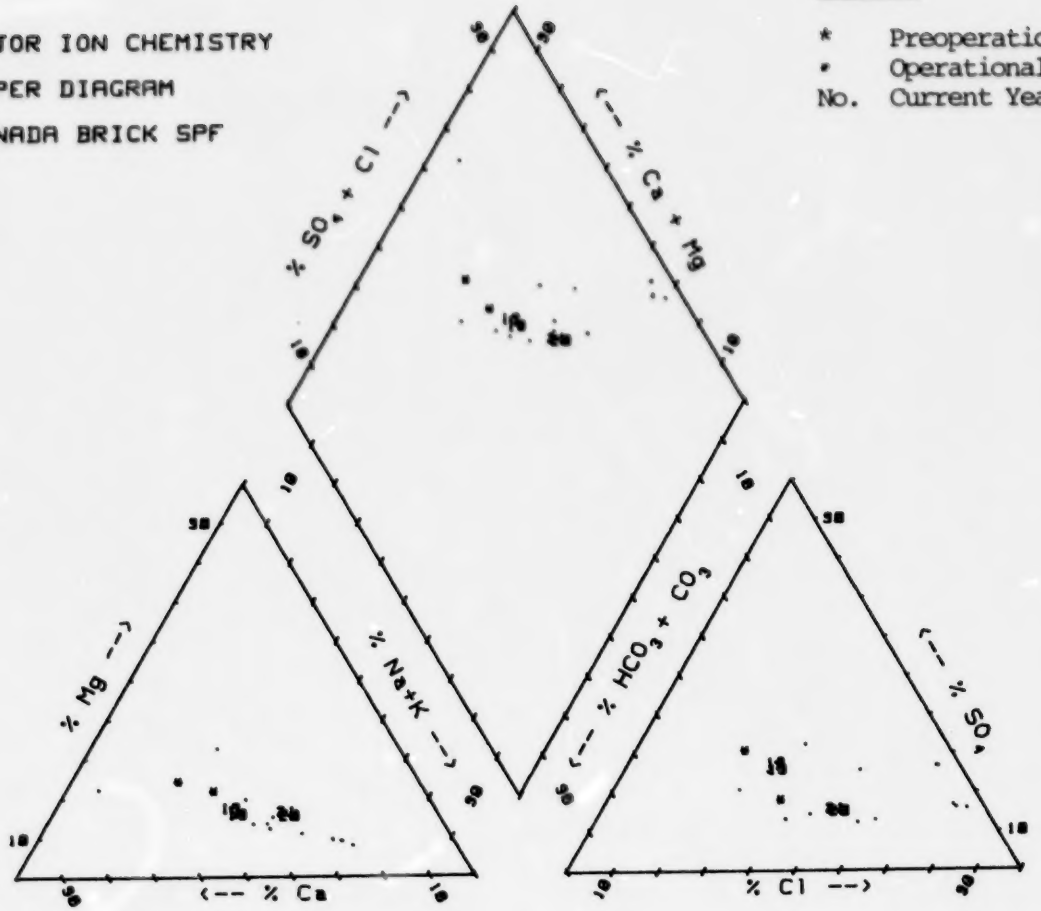
No. Current Year

FIGURE 3

MAJOR ION CHEMISTRY

PIPER DIAGRAM

CANADA BRICK SPF



Legend:

* Preoperational Period - before December 1981

• Operational Period - after December 1981

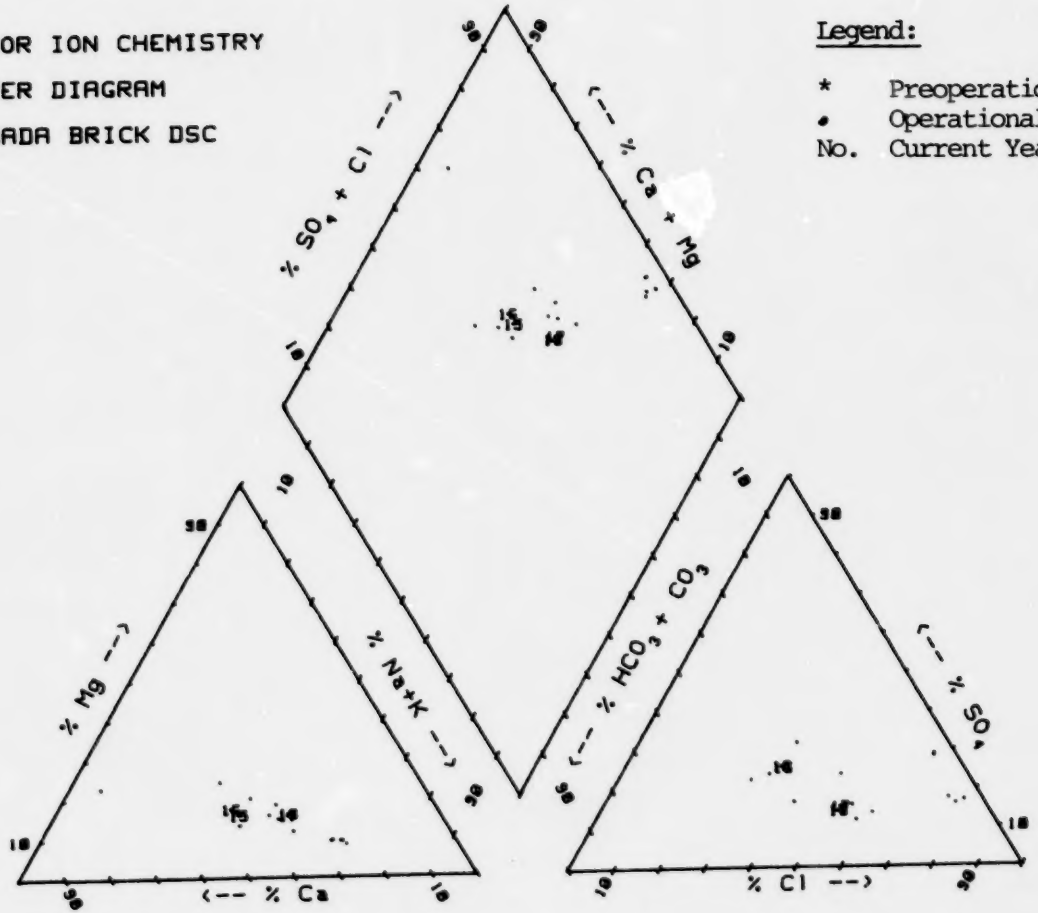
No. Current Year

FIGURE 4

MAJOR ION CHEMISTRY

PIPER DIAGRAM

CANADA BRICK DSC



Legend:

* Preoperational Period - before December 1981

• Operational Period - after December 1981

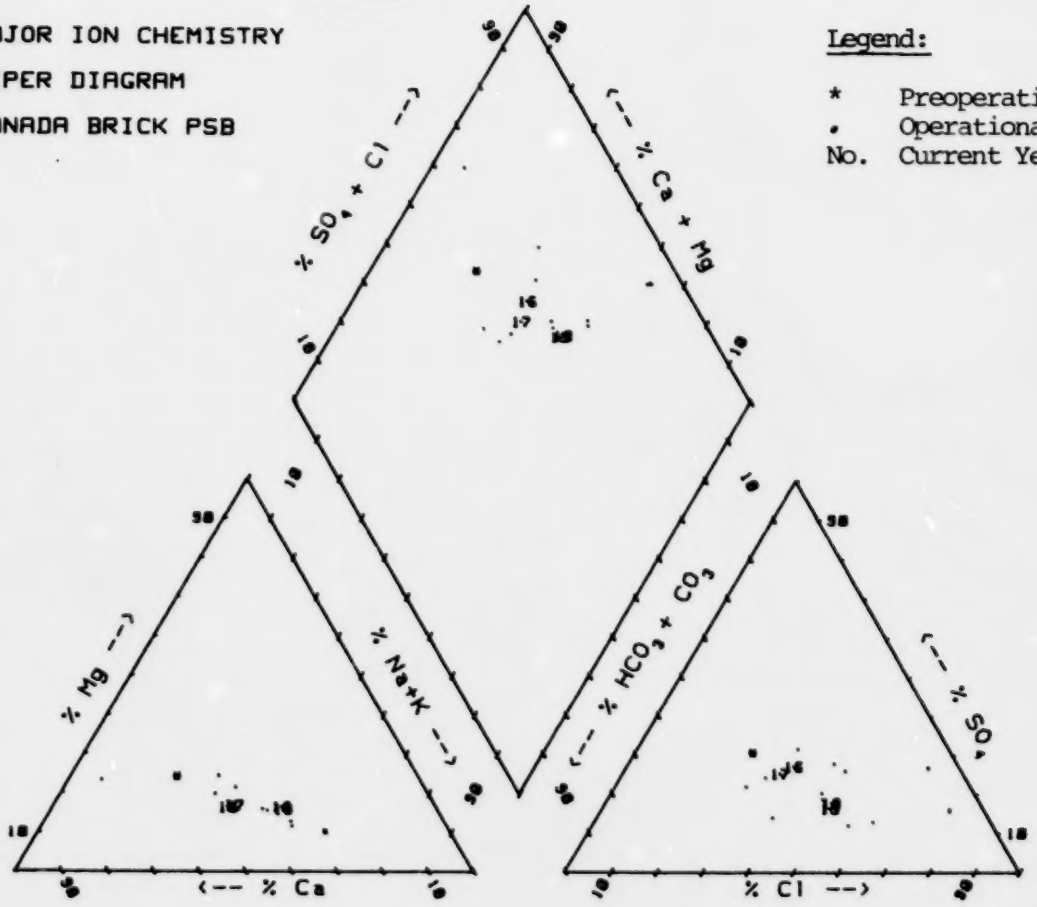
No. Current Year

FIGURE 5

MAJOR ION CHEMISTRY

PIPER DIAGRAM

CANADA BRICK PSB



Legend:

* Preoperational Period - before December 1981

. Operational Period - after December 1981

No. Current Year

FIGURE 6

DISTRIBUTION

Mr. D. Erwin	Supply Division, H6 A24
Mr. J.H.P. Buckingham (2)	Supply Division, KD 100
Dr. A.W. Jackson	Technical & Training Serv, A8 E2
Mr. J.H. Griffiths (3)	Canada Brick Company 3065 Mavis Road Mississauga, Ontario L5C 1T7
Mr. L.R. Lahti	Golder Associates 3151 Wharton Way Mississauga, Ontario L4X 2B6
Dr. T.W. Klym	Civil Research
Mr. D.J. Dodd	Chemical Research
Dr. B.R. Nott (2)	Chemical Research
Mr. J. Complak	Chemical Research
Dr. A. Golomb	Chemical Research
Mr. A.Z. Mlynarczyk	Chemical Research

Public Reference Centre
Editorial Section (2)
Office Copies (3)
Extra Copies (3)